

A NEW SECTION OF *CLITORIA* SUBGENUS  
*NEUROCARPUM* (LEGUMINOSAE)

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ABSTRACT

*Clitoria* subgenus *Neurocarpum* sect. **Mexicana**, sect. nov. is described including ser. nov. **Mexicana**, **Tucumania**, and **Americana**. Section *Mexicana* is contrasted with sect. *Tanystyloba* and sect. *Neurocarpum*. Series *Mexicana* includes *C. humilus* Rose, *C. mexicana* Link, *C. monticola* Brandegees, *C. polystachya* Benth., and *C. triflora* Wats. Series *Tucumania* includes *C. cordobensis* Burk. Series *Americana* includes *C. fragrans* Small and *C. mariana* L. A key to species of sect. *Mexicana* is provided.

RESUMEN

Se describe *Clitoria* subgénero *Neurocarpum* sección **Mexicana**, secc. nov., e incluye las ser. nov. **Mexicana**, **Tucumania** y **Americana**. La sección *Mexicana* se contrasta con la sección *Tanystyloba* y con la sección *Neurocarpum*. La serie *Mexicana* incluye, *C. humilus* Rose, *C. mexicana* Link, *C. monticola* Brandegees, *C. polystachya* Benth. y *C. triflora* Wats. La serie *Tucumania* incluye *C. cordobensis* Burk. La serie *Americana* incluye *C. fragrans* Small y *C. mariana* L. Hay una clave para identificar las especies en la sección *Mexicana*.

*Clitoria* (Leguminosae) comprises 60 species distributed primarily within the pantropical-subtropical belt, of which 49 species are native to the neotropics. The habit of species of *Clitoria* range from trees, shrubs, lianas, and subshrubs or perennial herbs with erect or twining, annual, aerial stems from an underground xylopodium. It is characterized by its showy, resupinate, papilionaceous flowers, infundibular calyx with persistent bracteoles, and stalked ovaries with a geniculate, bearded style.

*Clitoria* was last revised by Bentham in 1858. Fantz (1979b) recognized three subgenera circumscribed by fruits and seed morphology, supported by leaf, calyx, androecial, and gynoecial features, germination characteristics, and the presence or absence of cleistogamy. Proposed revisions are based on examination of nine thousand specimens, collected worldwide, that included types.

Fantz (1979a) circumscribed *Clitoria* subg. *Neurocarpum* by its turgid fruit with convex valves (ecostate or bearing a prominent medial nerve), thickened viscid seeds, a subcartilaginous 10-nerved calyx, hypogeal germination, and the presence of cleistogamous flowers in half of its 24 species. Species of subg. *Neurocarpum* have been segregated traditionally by growth form and vegetative characters,

TABLE 1. A COMPARISON OF THE SECTIONS OF SUBGENUS *Neurocarpum*.

Character	<i>Mexicana</i>		<i>Tanystyloba</i>		<i>Neurocarpum</i>	
Leaves						
Leaflet number	3-foliolate	3-foliolate	3- and 1-foliolate	3- and 1-foliolate	3- and 1-foliolate	3- and 1-foliolate
Petiole	Petiolate	Petiolate or subsessile	Petiolate or subsessile	Petiolate or subsessile	Petiolate or subsessile	Petiolate or subsessile
Inflorescence	(1)2-13 cm	0.3-1.5(2) cm	0.3-1.5(2) cm	1-10(20) cm	1-10(20) cm	1-10(20) cm
Axis length	Solitary	Fascicled to solitary	Fascicled to solitary	solitary	solitary	solitary
Number per axil						
Chasmogamous flowers						
Flower size	Small, 2.5-4 cm (4-6 cm in <i>C. mariana</i> )	Small, 2.5-4 cm	Small, 2.5-4 cm	Medium-large, (3.5)4-7.5 cm	Medium-large, (3.5)4-7.5 cm	Medium-large, (3.5)4-7.5 cm
Flower color	White or blue to purple	White	White	Blue to purple (white)	Blue to purple (white)	Blue to purple (white)
Calyx tube	Short, 7-12(14) mm	Short, 6-12 mm	Short, 6-12 mm	Long, 11-22(25) mm	Long, 11-22(25) mm	Long, 11-22(25) mm
Calyx lobes	Shorter than tube	Longer to subequal tube	Longer to subequal tube	Shorter than tube	Shorter than tube	Shorter than tube
Staminal tube	Short, 1.3-2.2 cm (2-3 cm in <i>C. mariana</i> )	Short, 1.3-2.2 cm	Short, 1.3-2.2 cm	Long, 2-4 cm	Long, 2-4 cm	Long, 2-4 cm
Style	Short, 1-2 cm	Short, 1-1.6 cm	Short, 1-1.6 cm	Long, 1.9-3 cm (1.4-1.9 cm in <i>C. falcata</i> )	Long, 1.9-3 cm (1.4-1.9 cm in <i>C. falcata</i> )	Long, 1.9-3 cm (1.4-1.9 cm in <i>C. falcata</i> )
Cleistogamous flowers	Present	Absent	Absent	Present	Present	Present
Calyx tube	Small, 3-6 mm			Large, 5-9(11) mm	Large, 5-9(11) mm	Large, 5-9(11) mm
Calyx lobes	Small, 1.5-3 mm			Long, 3-7 mm	Long, 3-7 mm	Long, 3-7 mm
Staminal tube	Elongate, 3-5 mm or nearly lacking, ca. 0.1 mm			Short, 0.5-1.5 mm	Short, 0.5-1.5 mm	Short, 0.5-1.5 mm
Legume and seeds						
Depressed between seed	Weak to strongly	Weakly	Weakly	Turgid, not depressed	Turgid, not depressed	Turgid, not depressed
Costa longitudinal	Ecostate	Ecostate	Ecostate	Costate or occasionally ecostate	Costate or occasionally ecostate	Costate or occasionally ecostate
Seed length/width	Width slightly longer than length	Width slightly longer than length	Width slightly longer than length	Length slightly longer than width	Length slightly longer than width	Length slightly longer than width
Legume width	Narrower, 5-9 mm	Broader, 7-11 mm	Broader, 7-11 mm	Broader, 7-11 mm	Broader, 7-11 mm	Broader, 7-11 mm

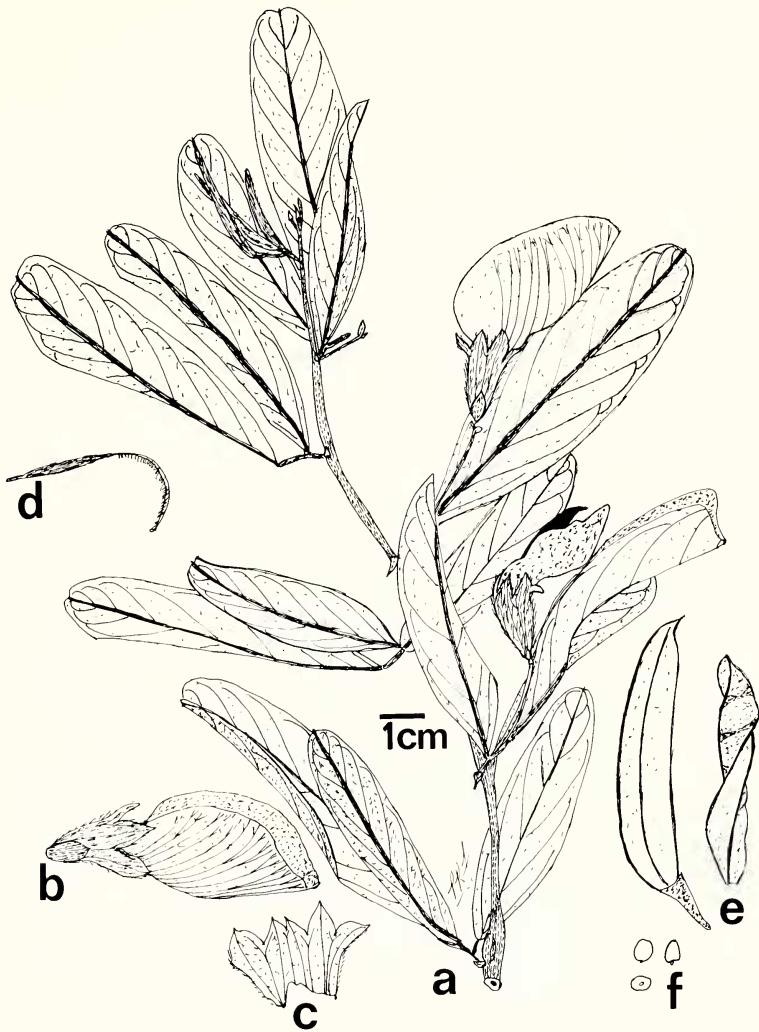


FIG. 1. *Clitoria laurifolia* Poir. (a) aerial stem,  $\times 0.5$ ; (b) flower,  $\times 0.5$ ; (c) calyx,  $\times 0.5$ ; (d) gynoeceum,  $\times 0.5$ ; (e) legumes,  $\times 0.5$ ; (f) three views of seed,  $\times 0.5$ . (Saltzmann s.n., G, a; Smith 2050, GH, b-f.)

e.g., leaflet number, petiole length, and leaflet shape and apices. Fruits and floral characters have been used rarely in floristic treatments or Bentham's (1858) treatise.

There are three sections within subg. *Neurocarpum* as distinguished by a combination of morphological characters and geographical distribution (Table 1). Section *Neurocarpum* (lectotype = *C. laurifolia* Poir., Fig. 1) is a South American group of 10 species with

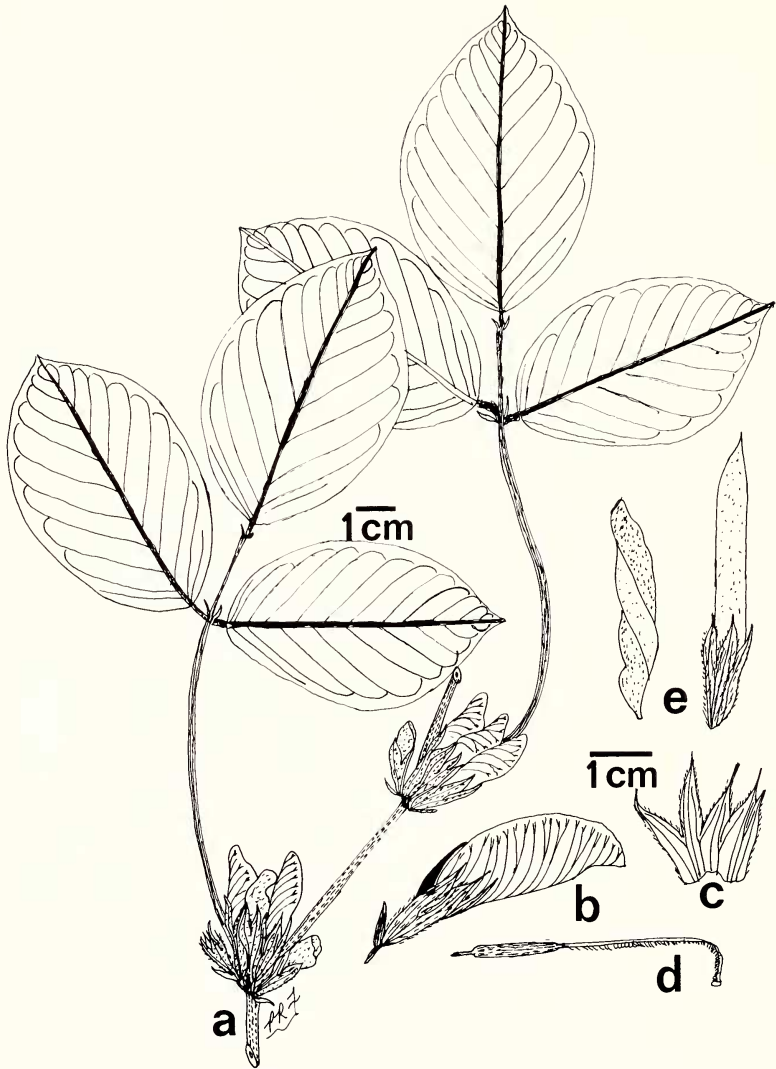


FIG. 2. *Clitoria macrophylla* Wall. ex Benth. (a) portion of stem,  $\times 0.5$ ; (b) flower,  $\times 1$ ; (c) calyx,  $\times 1$ ; (d) gynoceium,  $\times 1$ ; (e) legumes,  $\times 1$ . (Wallich 5345, K, a-e.)

three that extend into Central America and the West Indies. Members are characterized by fruits that are turgid, not depressed between the seeds, and often bearing a longitudinal, medial nerve (=costate fruit). Fruits in some species are ecostate or the costa is imperfectly formed. Seeds typically are slightly longer than they are wide (seed length = axis parallel with funiculus). Chasmogamous flowers typ-



FIG. 3. *Clitoria mexicana* Link. (a) portion of stem,  $\times 0.5$ ; (b) flower,  $\times 1$ ; (c) calyx,  $\times 1$ ; (d) gynoecium,  $\times 1$ ; (e) legumes,  $\times 1$ ; (f) three views of seed,  $\times 1$ . (Breedlove 12025, F, a; Hinton 11668, NY, b; Molina 18472, NY, c, d; Tucker 784, UC, e, f; Hernandez 1287, F, g.)

ically are larger, usually pigmented in shades of blue to purple, or occasionally white. Cleistogamy is present in most species.

Section *Tanystyloba* (type = *C. macrophylla* Wall. ex Benth., Fig. 2) includes five species of Southeast Asia and one endemic in Australia (Fantz, 1979a). Species are unique because they (1) lack cleis-

togamy, (2) bear a calyx with elongated lobes longer than the tube, and (3) possess a dense indumentum of uncinata hairs on the outer calyx surface. Short-petiolate to sessile leaves and occurrence of unifoliate leaves is similar to some species of sect. *Neurocarpum*.

A third group includes seven species from North and Central America and one species native to northern Argentina. These have turgid, ecostate fruits that are depressed between the seeds. Seeds are slightly wider than long. Plants are similar to those of species in sect. *Tanystyloba*, but differ by the presence of cleistogamous flowers, narrower fruits, and elongated inflorescences. These eight species are placed in sect. *Mexicana* (type = *C. mexicana* Link, Fig. 3), a new section of subg. *Neurocarpum*.

#### TAXONOMIC TREATMENT

Sect. *Mexicana* includes three distinct groups distinguished by morphological differences in fruit and chasmogamous and cleistogamous flowers, supported by geographical distribution. These are treated as Series as described below.

#### Key to Taxa of sect. *Mexicana*

Floral characteristics, unless otherwise noted, refer to chasmogamous flowers.

1. Gynophore 4–8 mm long, slightly shorter than the ovary; fruits conspicuously depressed between the seeds; staminal tube of cleistogamous flowers nearly lacking, ca. 0.1 mm long, filaments nearly free; flowers blue to lilac to pale purple, (3.5–)4–6 cm long ..... Series *Americana*
2. Calyx tube 7–10 mm long; leaflets narrow, 0.5–1 cm wide, primary nerves of 6–8 pairs; stipules 2–4 mm long, stipels 1–3 mm long; stipe 15–21 mm long; cleistogamous flowers with bracteoles 2–3 mm long, calyx tube 3–4 mm long, stipe 9–14 mm long ..... *C. fragrans*
2. Calyx tube 10–14 mm long; leaflets broad, 1–4(–6.5) cm wide, primary nerves of 7–12 pairs; stipules 5–10 mm long, stipels 3–8 mm long; stipe 5–17 mm long; cleistogamous flowers with bracteoles 3–5 mm long, calyx tube 4–5 mm long, stipe 5–10 mm long ..... *C. mariana*
1. Gynophore 3–4 mm long, much shorter than the ovary; fruits weakly depressed between seeds; staminal tube of cleistogamous flowers elongate, 3–5 mm long; flowers white or pale yellow, occasionally purple, 2.5–4 cm long.
  3. Stipe 8–16 mm long, exerted beyond calyx tube; carina with blade 10–11 mm long, claw 18–22 mm; style 8–10 mm long; cleistogamous flowers with staminal tube 3–4 mm long. One species ..... Series *Tucumania* (*C. cordobensis*)



3. Stipe 4–8 mm long, enclosed within calyx; carina with blade 5–9 mm long, claw 12–17 mm long; style 10–17 mm long; cleistogamous flowers with staminal tube 4–5 mm long . . . . . Series *Mexicana*
4. Flowers 3–4 cm long; calyx lobes 6–8 mm long; inflorescence racemose, 2–4(–6)-flowered; perennial herbs with aerial stems erect to twining.
  5. Vine; calyx tube 9–12 mm long, purplish; bracteoles 5–9 mm; inflorescence 2–11 cm long; leaflets ovate to lanceolate; stipules 6–9 mm long . . . . . *C. mexicana*
  5. Erect herb; calyx tube 7–9 mm long, greenish; bracteoles 3–4 mm long; inflorescence 0.2–0.3 cm long; leaflets oblong; stipules 4–6 mm long . . . . . *C. humilus*
4. Flowers 2.5–3 cm long; calyx lobes 2–5 mm long; inflorescence paniculate (occasionally racemose), 4–8-flowered or more; shrubs to subshrubs.
  6. Flowers lilac to purple; calyx lobes 4–5 mm long; stem pubescence spreading; bracteoles 7–9 mm long; cleistogamous flowers not observed . . . . . *C. triflora*
  6. Flowers white; calyx lobes 2–4 mm long; stem pubescence ascending, subappressed; bracteoles 4–7(–9 in variety *C. polystachya*) mm long; cleistogamous flowers present.
    7. Inflorescence racemose, few flowered; carina with blade 5–7 mm long; wings with blade 8–11 mm long, claw 10–14 mm long; style 10–11 mm long; ovary moderately uncinately pubescent; leaflets narrower, 1.5–3.5 cm wide, primary nerves of 3–6 pairs; petiole 3–6 cm long, petiolule 2–3 mm long . . . . . *C. monticola*
    7. Inflorescence paniculate, many-flowered; carina with blade 7–8 mm long; wings with blade 12–14 mm long, claw 8–11 mm long; leaflets broader, 2–6 cm wide, primary nerves of 8–12 pairs; petiole 4–10 cm long, petiolule 3–5 mm long . . . . . *C. polystachya*

**Clitoria** L. subgenus **Neurocarpum** (Desv.) Baker sect. **Mexicana**  
Fantz, sect. nov.

Sectione nova *Clitoria* subgenere *Neurocarpum* cum *Tanystyloba* affini optimo distinguitur a inflorescentia solitario et elongato, calyce lobis breviores longi tubo et flores cleistogamis praesentia.

Leaves 3-foliolate, petiolate. Inflorescences axillary, solitary, paniculate or racemose, (1–)2–several flowered; peduncles 2–13 cm long. Chasmogamous flowers showy, white or blue to purple, 2.5–4(–6) cm long. Calyx tube 7–12(–14) mm long; lobes shorter than

the tube; sparingly to moderately pubescent with uncinat trichomes and subappressed macroscopic trichomes. Staminal tube 1.3–2.2(–3) cm long. Style 1–2 cm long. Cleistogamous flowers inconspicuous, 0.4–0.9 cm long. Calyx tube 3–6 mm long; lobes 1.5–3 mm long. Staminal tube elongate, 3–5 mm long, or ca. 0.1 mm long. Legume ecostate, valves weakly to strongly depressed between seeds.

Sp. typica: *Clitoria mexicana* Link.

Members of sect. *Mexicana* typically occur in dry sandy soils, often in drier woodlands of lowlands and mountain slopes to about 2700 m. Three distinct series are observed.

### 1. Series **Mexicana**

Shrubs, subshrubs to suffrutescent herbs. Chasmogamous flowers 2.5–4 cm long, white fading pale yellow, or occasionally purplish; gynophore 3–4 mm long, much shorter than the ovary; style 10–17 mm long. Cleistogamous flowers with staminal tube 3–5 mm long. Legume weakly depressed between the seeds, short-stipitate; stipe 4–8 mm long; seeds slightly wider than long. Central America.

Series *Mexicana* includes the following species: *C. humilus* Rose, Mexico (holotype: *Rose 2251*, US!), *C. mexicana* Link, Mexico to Nicaragua (neotype: *Hinton 11668*, NY!), *C. monticola* Brand., Mexico to Panama (lectotype: *Hartweg 454*, K!), and *C. triflora* Wats., Mexico (lectotype: *Palmer 159*, GH!). These species are postulated to have originated in Mexico with two species migrating into Central America. Wiggins (1980) omitted *C. monticola* from the flora of Baja California.

### 2. Series **Tucumania** Fantz, ser. nov.

Serie nova *Mexicana* optimo distinguitur a stipite elongato, carino longiores, stylis breviores, et tubo staminali e flores cleistogamis breviores. Tucumania.

Perennial suffrutescent herbs. Chasmogamous flowers 2.5–3 cm long, white; gynophore 3–4 mm, much shorter than the ovary; style 5–6 mm long. Cleistogamous flowers with staminal tube 3–4 mm long. Legume long-stipitate, valves weakly depressed between the seeds; stipe 10–16 mm long; seeds slightly wider than long. Argentina.

Sp. typica: *Clitoria cordobensis* Burkart.

*Clitoria cordobensis*, endemic to northern Argentina (lectotype: *Nicora 1774*, SI!), is the only member of this series.

### 3. Series **Americana** Fantz, ser. nov.

Serie nova *Mexicana* optimo distinguitur a gynophoro elongato fere subequalis ovario, flores statura ampliore, et tubo staminali e



flores cleistogamis brevissimo. Americana cum orientalis disjuncto varieto.

Perennial suffrutescent herbs. Chasmogamous flowers 3.5–6 cm, bluish to lilac to pale purple; gynophore 4–8 mm long, slightly shorter than the ovary; style 13–20 mm long. Cleistogamous flowers with the staminal tube ca. 0.1 mm long, the stamens appearing to be free. Legumes conspicuously depressed between the seeds, long-stipitate; stipe 10–21 mm long; seeds slightly longer than wide. United States (one variety in se. Asia).

Sp. typica: *Clitoria mariana* L.

Series *Mariana* includes two species, *C. mariana* L., from the U.S. with a variety in Southeast Asia (type: *Hb. Petiver*, BM—Hb. Sloane) and *C. fragrans*, an endemic to southern Florida (lectotype: *Small and Wherry 12626*, NY!).

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